(12) **UK Patent Application** (19) **GB** (11) **2 378 862** (13) **A**

(43) Date of A Publication **19.02.2003**

(21) Application No 0215632.1

(22) Date of Filing 05.07.2002

(30) Priority Data
(31) **0109016** (32) **06.07.2001** (33) **FR**

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(51) INT CL^7
H04Q 7/32

(52) UK CL (Edition V)
H4L LECCP LECTW
H4F FRM F3P F3T

(56) Documents Cited
EP 1185104 A1 **EP 1059812 A2**
US 5949484 A

(58) Field of Search
UK CL (Edition T) **H4F** FRM F3P F3T, **H4L** LECCP
LECCX LECTW LECTX
INT CL^7 **G06F** 12/08 15/78 17/60, **H04L** 29/06, **H04M**
1/73 11/06, **H04N** 7/14, **H04Q** 7/32
Other: Online: **EPODOC, WPI, PAJ**

(54) Abstract Title
Control and management method for the status of a battery in a portable multimedia device

(57) The invention is concerned with a method to control and manage the status of a battery of a portable multimedia device equipped arranged to memorize and process digital data representing audio and video sequences and to display the video sequences on a screen. The method comprises steps of downloading an audiovisual data flow in the means of memorization; evaluating the energy available in the battery; and selecting either a first processing of the memorized data that needs only a part of the energy available in the battery, so as to conserve a pre-determined quantity of energy, or a second processing of the memorized data that needs all the available energy. The digital video data may be encoded according to the MPEG standard using the first process wherein all frames of the stored video sequence are displayed, or using the second process wherein only frames of Intra type, or a fraction of Intra frames, are displayed. Also disclosed is an apparatus for implementing the method as previously described.
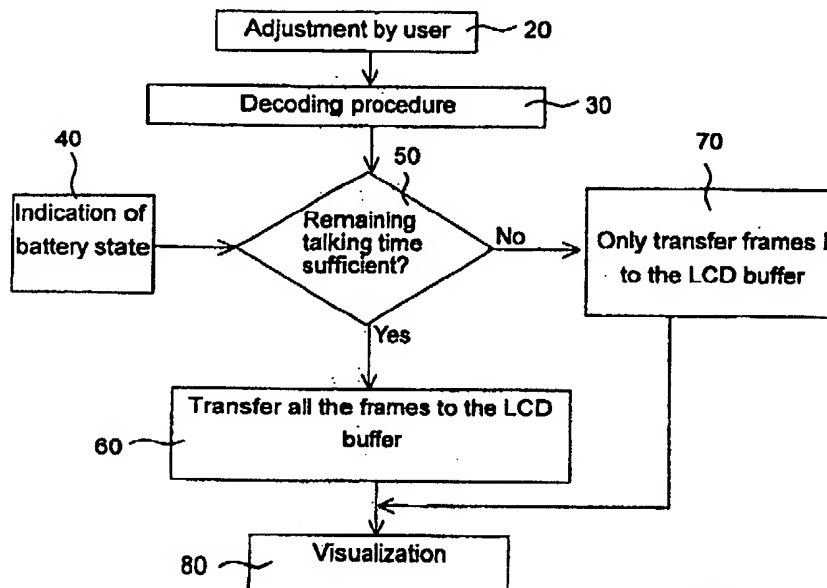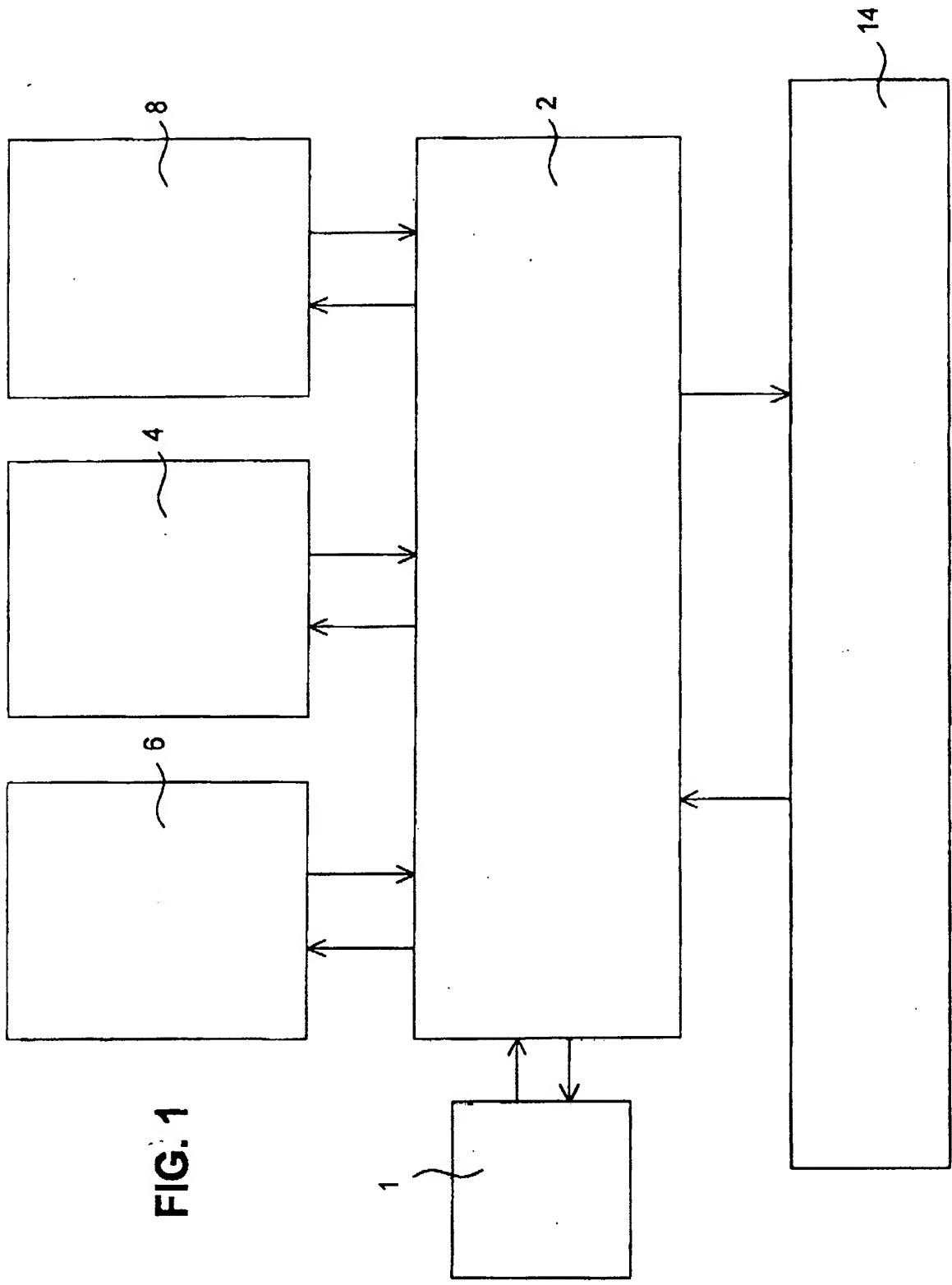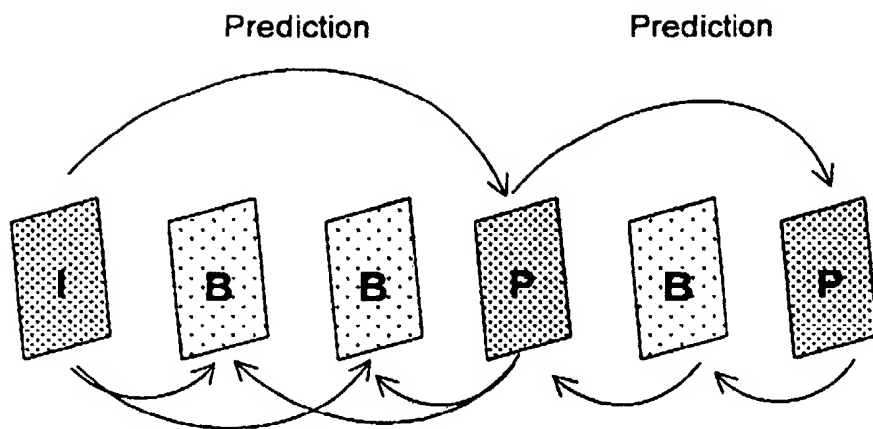
FIG. 3

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FIG. 1

Prediction   Prediction

I   B   B   P   B   P

FIG. 2

Adjustment by user —— 20

Decoding procedure —— 30

50

Indication of
battery state
40

Remaining
talking time
sufficient?

No

Only transfer frames I
to the LCD buffer
70

Yes

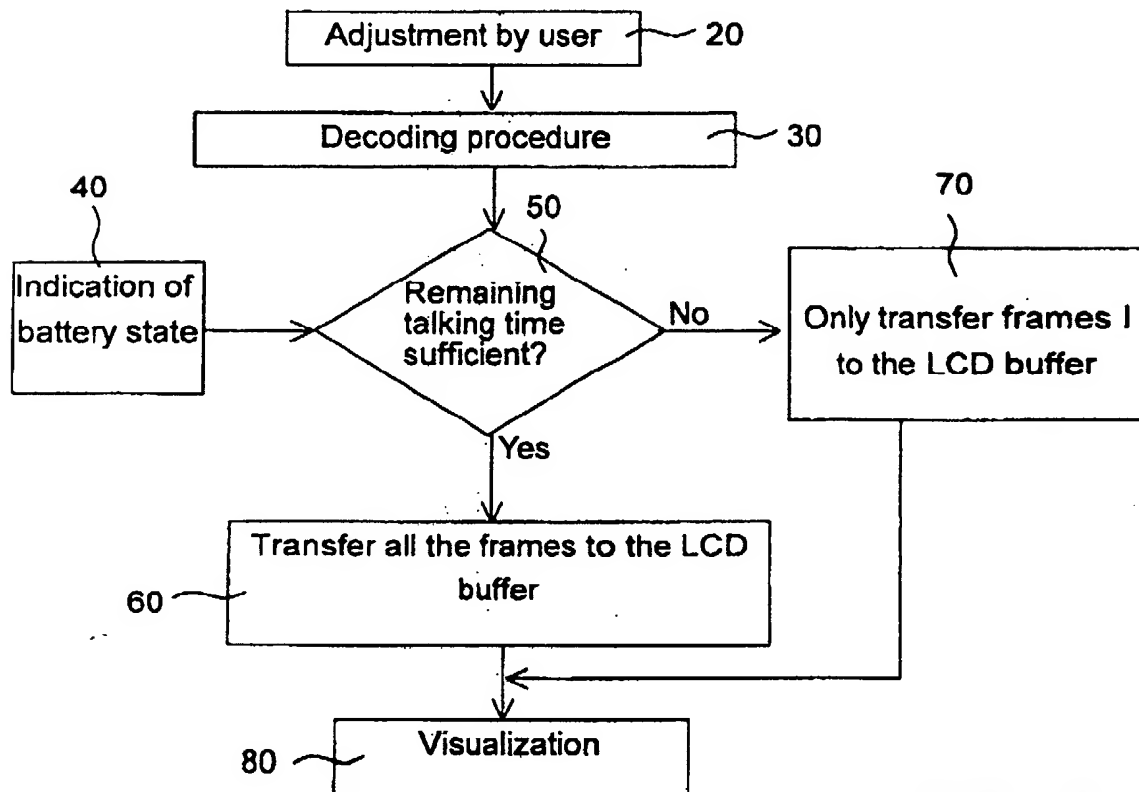Transfer all the frames to the LCD
buffer

60

Visualization

80

FIG. 3

CONTROL AND MANAGEMENT METHOD FOR THE STATUS OF THE
BATTERY OF A PORTABLE MULTIMEDIA DEVICE

TECHNICAL FIELD

The invention is concerned with a method to control

5 and manage the status of the battery of a portable

multimedia device equipped with means to memorize digital

data representing audio and video sequences, with means to

process the sequences and with a display screen of the

video sequences.

10   The invention is also concerned with a multimedia

device in which the process is used.

DESCRIPTION OF THE BACKGROUND ARTS

With the development of the UMTS (Universal Mobile

Telecommunication System) third-generation (3G) mobile

15 communication system, a user will be able to have at his

or her disposal one or more than one mobile terminals

(portable telephone, PDA: Portable Digital Assistant,

pocket videophone or micro-computer). This will allow

high-speed communication for the exchange of voice and

20 image data while in motion and telecommuting situations.

The need for data and video services (database, file

transfer, high resolution facsimile, mobile video

telephony) and the interconnection with broadband networks

require an increasing amount of processing and a large

quantity of energy.

Thus, in case of mobile telephones, the download time of a video image or audio file in the multimedia applications MPEG4/H.263 and MP3 and the display of the video images involve a great consumption of energy, which, as a result, reduces talking time. Moreover, the batteries now obtainable in the market do not supply enough power, considering the increase in calculation required by multimedia applications.

SUMMARY OF THE INVENTION

Therefore, the purpose of the present invention is to provide a method which makes it possible to economize the energy of the batteries in multimedia devices.

In accordance with a first aspect of the invention there is provided a method to control and manage a status of a battery of a portable multimedia device including memory to store digital data representing audio and visual sequences, means to process said sequences and a screen to display the video sequences, the method comprising the steps of

downloading an audiovisual data flow into the memory;

evaluating energy available in the battery; and

selecting either first processing of the stored data needing only a part of the energy available in the battery, so as to conserve a pre-determined quantity of energy, or second processing of the stored data needing more than said part of the available charge.

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In accordance with another form of the invention, the method comprises the steps of:

downloading an audiovisual data flow in the means of memorization associated with the multimedia device;

evaluating the energy available in the battery; and

selecting either first processing of the memorized data that needs only a part of the energy available in the battery, so as to conserve a pre-determined quantity of energy, or second processing of the memorized data that needs all the available energy.

According to the present invention, first processing consists in displaying all the frames of a memorized video sequence and the second processing consists in displaying only a part of the frames of the sequence.

In a preferred manner of realizing the invention, in which digital data include images coded according to the MPEG standard, the first processing consists in displaying all the frames of a video sequence and the second processing consists in displaying only the Intra type frames or a fraction of the Intra frames.

In accordance with another aspect of the invention there is provided a portable multimedia device including memory to store digital data representing audio and video sequences, means to process said sequences and a screen to display the video sequences and further comprising:

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an interface adapted to download a flow of audiovisual data to said memory;

means to evaluate energy available in a battery; and

means to select either first processing of the stored data needing only a part of available energy so as to conserve a pre-determined quantity of energy in the battery or second processing of the stored data needing greater than said part of the available energy.

In accordance with another form of the invention, the method is used in a multimedia device that comprises:

an interface adapted to download an audiovisual data flow to the means of memorization associated with the multimedia device;

means to evaluate the energy available in a battery; and

means to select either first processing of the memorized data needing only a part of the energy available in the battery of the multimedia device, so as to conserve a pre-determined quantity of energy, or second processing of the memorized data needing all the available energy.

The multimedia device can be a portable telephone, a PDA or a micro-computer.

BRIEF DESCRIPTION OF THE DRAWINGS

Other features and advantages of the invention shall emerge from the description that follows, which is taken

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as a non-limited example in reference to the attached

drawings in which:

Figure 1 shows a block diagram of a multimedia device
in which the method is used, in accordance with the
5   invention;

Figure 2 schematically illustrates the chaining of
three types of MPEG standard video frames;

Figure 3 shows a flow chart giving an example of
application of the method, in accordance with the
10   invention.

DETAILED EXPLANATION OF THE INVENTION

The description given below illustrates an example of
application of the process according to the invention to
economize the energy of the battery of a third-generation
15   mobile telephone.

Figure 1 schematically illustrates the structure of
such a telephone. The latter contains a
transmitting/receiving module 1, a central processing unit
2, an interchangeable memory 4, a keyboard 6, an LCD
20   screen 8 and a battery 14 with a pre-determined charge.

The memory 4 is intended to memorize the video frames
received at the moment of communication, before they are
displayed on the screen 8. This memory 8 can be either
integrated into the mobile telephone or composed of a
25   removable card which can be plugged into a location on the

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mobile telephone prepared for this purpose. The user can
then use a set of interchangeable memory cards which allow
the storage of images while waiting for them to be
transferred to a computer, for example.

5   A feature of the invention allows the user to select
to display all of the frames of a memorized image or a
part of these frames.

        Figure 2 schematically illustrates the chaining of
three types of MPEG standard video frames. It should be
10   noted that the specifications of the MPEG-4 and H.263
converters are based on the principle of the compensating
movement using the strong temporal redundancy of the
successive images that compose a video sequence. In fact,
two successive images are often practically identical and
15   differ from each other only in the fact that a tiny part
of the image has moved. Therefore, at the moment of the
transmission of a video sequence, in place of the
transmission of all the frames of an image to the decoder,
only the difference between two successive images and the
20   displacement vector associated with this difference are
transmitted. The decoder restores the image from this
difference and the displacement vectors calculated in
advance.

        To this end, the MPEG standard defines three types of
25   image:

        (1) Frames I (intra), which are coded without

reference to other images, that is, they contain all the elements required for their restoration by the decoder without decoding an entire of video sequence; .

(2) Frames P (predicted), which are coded in relation to the preceding image type, I or P, due to prediction technology with compensating movement. These frames are restored from the differences calculated between the current frame and those which precede it; and

(3) Frames B (bi-directional), which are coded by interpolation between the two preceding images of type I or P that encloses them.

Figure 3 gives a flow chart showing the use of the process in accordance with the invention, to economize the energy of the battery of a third-generation mobile telephone, when a video sequence transmitted in the form of binary flow is displayed.

At step 20, the user selects the frames which must be displayed. For this purpose, a menu scrolling on the screen 8 presents several display options. The user can program a partial display of the frames I from a video sequence stored in the memory 8 in advance, and as a function of the talking time the user wishes to conserve. The user can, for example, conserve a minimum duration of time for voice communication. By selecting this minimum duration, the processing unit 2 adapts the display type and transmits to the screen 8 only the frames I or a part

of these frames. The user can modify at any moment the programming of the display by increasing or decreasing the duration of voice communication he or she wishes to conserve. The user can also select the display of all the

5 frames I, P and B of the video sequence.

At step 30, the central unit directs the automatic decoding of the received video sequences and the memorization of these sequences, and evaluates the probable duration required to display the memorized video

10 sequence da.

At step 40, the central unit 2 reviews the charge state of the battery 14 and directs the display of the probable duration of communication remaining still available dc, and of the probable duration required to

15 display the memorized video sequence da.

At step 50, the central unit 2 compares the probable duration of communication remaining still available dc with the sum (dv + da) of the duration of voice communication dv that the user desires to conserve and the

20 probable duration required to display the memorized video sequence da and:

If dc is greater than dv + da, then the central unit 2 directs, at step 60, the display of all the frames I, P and B of the memorized video sequence;

25 If dc is smaller than dv + da, then the central unit 2 directs, at step 70, the display of the frames I or of a

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part of these frames so as to conserve a duration at least equal to dv at the end of the display.

At step 80, the frames to be displayed are transmitted to the screen 8.

For example, TABLES I, II, III and IV given below show, respectively, the video frames at the input of a decoder integrated into the mobile telephone, at the output of the decoder, at the input of a display manager, which drives the screen 8 if dc is smaller than dv + da, and at the output of the display manager if dc is greater than dv + da.

TABLE I: Input of the decoder:

Frame No.	1	4	2	3	7	5	6	10	8	9	13	11	12
Type	I	P	B	B	P	B	B	I	B	B	P	B	B

TABLE II: At the output of the decoder:

Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Type	I	B	B	I	B	B	P	B	B	I	B	B	B

TABLE III: At the input of the display manager,
if dc is smaller than dv + da

Frame No.	1	2	3	4	5	6	7	8	9	10	11	12	13
Type	I									I			

TABLE IV: At the output of the display manager,
if dc is greater than dv + da

Frame No.	1	4	2	3	7	5	6	10	8	9	13	11	12
Type	I	P	B	B	P	B	B	I	B	B	P	B	B

According to the invention, the process thus makes it possible to reserve a minimum duration of voice communication by dynamically modifying the display of the video sequences processed in advance.

5   This process is applicable to all the devices using MPEG-2 or MPEG-4/H.263 applications as UMTS.

In the means of realization described above, the video parameters are decoded in the mobile telephone immediately before the reconstitution on the LCD screen 8.

Each feature disclosed in this specification (which term includes the claims) and/or shown in the drawings may be incorporated in the invention independently of other disclosed and/or illustrated features.

Statements in this specification of the "objects of the invention" relate to preferred embodiments of the invention, but not necessarily to all embodiments of the invention falling within the claims.

The description of the invention with reference to the drawings is by way of example only.

The text of the abstract filed herewith is repeated here as part of the specification.

The invention is concerned with a method to control and manage the status of a battery of a portable multimedia device equipped with means to memorize digital data representing audio and video sequences, with means to process the sequences and with a display screen of the video sequences. The process comprises the steps of downloading an audiovisual data flow in the means of memorization; evaluating of the energy available in the battery; and selecting either first processing of the memorized data that needs only a part of the energy available in the battery, so as to conserve a pre-determined quantity of energy, or second processing of the memorized data that needs all the available energy.

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WHAT IS CLAIMED IS:

1.   A method to control and manage a status of a battery of a portable multimedia device including memory to store digital data representing audio and visual sequences, means to process said sequences and a screen to display the video sequences, the method comprising the steps of

downloading an audiovisual data flow into the memory;

evaluating energy available in the battery; and

selecting either first processing of the stored data needing only a part of the energy available in the battery, so as to conserve a pre-determined quantity of energy, or second processing of the stored data needing more than said part of the available energy.

2.   The method in accordance with claim 1 wherein said second processing needs all available energy.

3.   The method in accordance with Claim 1 or claim 2 wherein the first processing displays all frames of a stored video sequence and the second processing displays only a part of frames of said sequence.

4.   The method in accordance with any one of claims 1 to 3 wherein digital image data coded according to MPEG standard using the first processing displays all frames of a stored video sequence and image data coded according to MPEG standards using second processing displays only frames of Intra type, or a fraction of said Intra frames.

5.   A portable multimedia device including memory to store digital data representing audio and video sequences, means to process said sequences and a screen to display the video sequences and further comprising:

an interface adapted to download a flow of audiovisual data to said memory;

means to evaluate energy available in a battery; and

means to select either first processing of the stored data needing only a part of available energy so as to conserve a pre-determined quantity of energy in the battery or second processing of the stored data needing greater than said part of the available energy.

6.   The device according to Claim 5 wherein said second processing needs all the available energy.

7. The device according to Claim 5 or Claim 6 wherein a flow of data containing images coded according to MPEG standard using first processing displays all frames of a stored video sequence, and a flow of data containing images coded according to MPEG standard using second processing displays only frames of Intra type, or a fraction of said Intra frames.

8. A portable telephone including a data processing program adapted to make use of the method according to any one of claims 1 to 4.

9. A portable micro-computer including a data processing program adapted to make use of the method according to any one of claims 1 to 4.

10. A personal digital assistant including a data processing program adapted to make use of the method according to any one of the Claims 1 to 4.

11. A portable multimedia device according to any of Claims 5 to 7, being a portable telephone, a portable microcomputer or a personal digital assistant.

12. A method to control and manage a status of a battery of a portable multimedia device substantially as herein described with reference to the accompanying drawings.

13. A portable multimedia device substantially as herein described with reference to the accompanying drawings.

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance	
X	1-3, 5, 6 & 8-11	EP 1185104 A1	(MOTOROLA) see whole document, particularly paragraphs 4, 6 & 10
A		EP1059812 A2	(LUCENT TECHNOLOGIES INC)
X	1-6 & 8-11	US 5949484	(NAKAYA ET AL.) see column 2 line 60 - column 4 line 11

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^V:

H4F, H4L

Worldwide search of patent documents classified in the following areas of the IPC^7 :

G06F, H04L, H04M, H04N, H04Q

The following online and other databases have been used in the preparation of this search report :

EPODOC, WPI, PAJ